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A new 0.9 Ma oxygen isotope stratigraphy for a shallow-water sedimentary transect across three IODP 317 sites in the Canterbury Bight of southwest Pacific Ocean

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Sedimentary records in shallow-water environment provide unique opportunity to further our understanding on the regional relative sea level changes in relation to global climate change. Here we present a new 0.9 Ma oxygen isotope stratigraphy for a shallow-water sedimentary transect across three IODP 317 sites in the Canterbury Bight of southwest Pacific Ocean. The three sites are located on the eastern margin of the South Island of New Zealand, including a continental slope site, IODP317-U1352 and two continental shelf sites, IODP317-U1354 and IODP317-U1351. We first generated high resolution benthic foraminifers (Nonionella flemingi) δ18O records for the three sites and a planktonic (Globigerina bulloides) record for the U1352B. An initial chronological framework for the benthic δ18O record of the U1352B was constructed using 8 accelerator mass spectrometry (AMS) radiocarbon dates and 4 biostratigraphic events. Then a refined age model was established by correlating the U1352B benthic δ18O record with the EDC δD record on the AICC2012 time-scale, and the LR04 benthic δ18O stack. Although the U1354B and U1351B have lower sedimentation rates, their benthic δ18O records correlate well with that of U1352B. In order to ensure the accuracy of the chronostratigraphic framework established, we also analyzed the characteristics of sedimentary grain size and the planktonic and benthic δ18O values. In accord with the adjacent sites, the results show that the melt of Southern Alps glaciers due to the warming climate during MIS 11 and 5.5 led to the increased fresh water delivery, with massive terrigenous deposit; and the warm SST during the MIS7 is related with the STF migration, which led to strong current activity, with coarser grain size. Meanwhile, records of benthic δ18O, sedimentation rate and content of >63μm coarse fraction of site U1352 all indicate the MIS 20 was indeed a colder interval compared to subsequent glacial times.